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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/705,680	11/10/2003	Hyeong-Geun An	5649-1197	4655
20792	7590	10/03/2005	EXAMINER	
MYERS BIGEL SIBLEY & SAJOVEC			TRAN, LONG K	
PO BOX 37428			ART UNIT	
RALEIGH, NC 27627			PAPER NUMBER	
			2818	

DATE MAILED: 10/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/705,680

Applicant(s)

AN ET AL.

Examiner

Long K. Tran

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fm

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 12 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1 - 12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 - 6 and 10 - 12 is/are rejected.
- 7) ☒ Claim(s) 7-9 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 5/10/04, 11/08/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of **Group I**, claims **1 – 12** and applicant's cancellation of **Group II**, claims **13 – 33** in the reply filed on August 12, 2005 are acknowledged.

Claims **1 – 12** are presented for examination.

### ***Priority***

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed on November 12, 2003.

### ***Information Disclosure Statement***

3. This office acknowledges of the following items from the Applicant:

Information Disclosure Statements (IDS) filed on May 10, 2004 and on November 08, 2004.

The references cited on the PTO -1449 form have been considered.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims **1, 2, 3, 4, 6, 10, 11** and **12** are rejected under 35 U.S.C. 102(b) as being anticipated by Agarwal et al. (US Patent No. 6,297,527).

Regarding claim **1**, Agarwal discloses a ferroelectric capacitor comprising:

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a support insulating film 64 (figs. 1 – 21; column 5, lines 9 & 10) on an integrated circuit substrate 50 (figs. 1 – 21; column 5, lines 1 – 5) and having a trench therein 92 (figs. 4 – 21;

a lower electrode 76/78 (figs. 2, 3 and 11 – 21; column 5, lines 28 – 34) on sidewalls and a bottom surface of the trench 92;

a seed conductive film 74 (figs. 11 – 21; column 5, lines 28 – 34; *Note that, although Agarwal does not label layer 74 as a seed layer, this layer is made of platinum similar to that of the platinum seed layer 300a of the claimed invention and furthermore function as an intermediate layer between the lower electrode and the ferroelectric layer in a manner similar to the invention. Therefore, platinum layer 74 is broadly considered as seed layer*) covering the lower electrode 76/78;

a ferroelectric film 72 (figs. 2, 3, 7 – 8 and 12 – 21; column 4, lines 52 – 65 and column 5, lines 23 – 27) on the support insulating film 64 and the seed conductive film 74; and

an upper electrode 70 (figs. 1 – 3 ,8, 14 and 21 on the ferroelectric film 72.

Regarding claim 2, Agarwal discloses the lower electrode fills ("fills' broadly interpreted, partially fills) the trench 92 and wherein the ferroelectric film 72 extends over all of the seed conductive film 74 and the support insulating film 64 (broadly interpreted) adjacent the seed conductive film 74.

Regarding claim 3, Agarwal discloses the lower electrode 76/78 includes an UPPER portion (broadly interpreted; examiner's modified drawing fig. 2') thereof extending from the trench to a height relative to the integrated circuit substrate greater

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than a height of the support insulating film and wherein the seed conductive film covers the upper portion of the lower electrode extending from the trench.

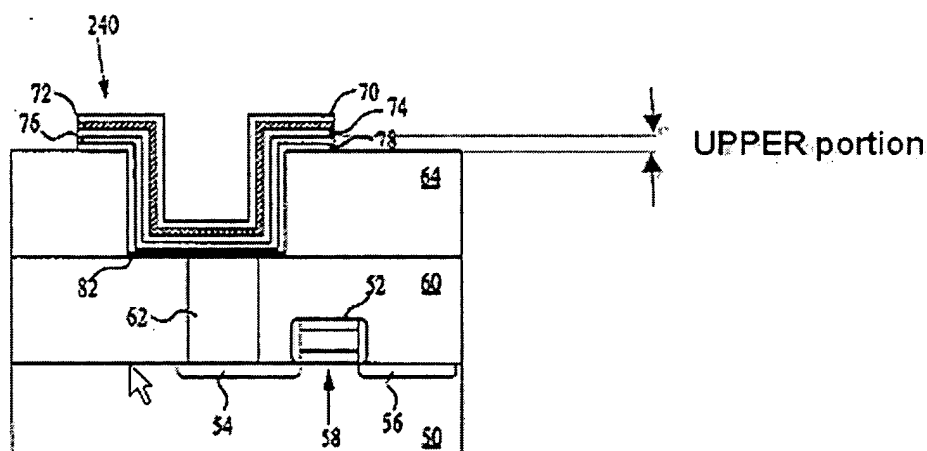


FIG. 2'

Regarding claim 4, Agarwal discloses an insulating film 60 (figs. 1 – 21) between the support insulating film 64 and the substrate 50; and a contact plug 62 (figs. 1 – 21) extending through the insulating film 60 and electrically connecting the lower electrode 76/78 to an active region of the integrated circuit substrate 50.

Regarding claim 6, Agarwal discloses the seed conductive film 74 comprises platinum (column 5, lines 29) and wherein the ferroelectric film comprises HDC such as  $\text{SrTiO}_3$ ,  $\text{SrBi}_2\text{Ta}_2\text{O}_9$ . (column 4, lines 53 – 65 and column 5, lines 23 – 27).

Regarding claims 10 and 11, Agarwal discloses the lower electrode 74 and the upper electrode 70 comprise platinum (column 5, lines 15 – 23 and lines 28 – 30).

Regarding claim 12, Agarwal discloses an integrated circuit memory device having a plurality of cells arranged in a cell arrays, ones of the cells including the ferroelectric capacitor of claim 1 (column 1, lines 6 – 11).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Agarwal et al. (US Patent No. 6,297,527) in view of Kumura et al. (US Patent Application Publication No. 2002/0075736).

Regarding claim 5, Agarwal discloses the claimed invention of claim 1 except for the support insulating film comprises titanium oxide.

Kumura, shows a semiconductor memory device comprising a ferroelectric capacitor which includes support insulating (broadly interpreted) comprising titanium oxide 44 and silicon nitride 43 (fig. 23; [0093]).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to provide the support insulating film of Agarwal with the support insulating film comprising titanium oxide of Kumura, in order to provide reaction protective means for the ferroelectric film ([0093]).

***Allowable Subject Matter***

8. Claims 7 – 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is an examiner's statement of reasons for the indication of allowable subject matter: Claims 7 – 9 are allowable over the prior art of record because none of the prior art whether taken singularly or in combination, especially when these limitations are considered within the specific combination claimed, to teach:

a multilayer structure lower electrode comprises an upper noble metal, a lower noble metal and a conductive oxide layer of the lower noble metal therebetween; and lower noble metal and the conductive oxide layer are conformal to sidewalls and the bottom surface of the trench; and among other limitations cited in claim 7.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 571-272-1797. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 571-272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LKT

September 30, 2005

A handwritten signature in black ink, appearing to read "LKT", with a horizontal line drawn underneath it.